

UCHIYAMA -- 09/616,364
Client/Matter: 008312-0271598

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. - 5. (Canceled)

6. (Currently Amended) An optical head device comprising:
a first light source for emitting a first light beam of a first wavelength;
a second light source which emits a second light beam of a second wavelength which is longer than differing from said the first wavelength;
a single block wherein the first and second light sources are aligned thereon;
an objective lens which causes for causing the light beams from ~~[[said]]~~ the first light source and second light source to converge on ~~an optical disk~~ a recording medium; and
a diffraction grating having first and second surfaces~~[[;]]~~,
wherein the objective lens, the first light source and the second light source are disposed such that an optical axis of the second light beam substantially coincides with an optical axis of the objective lens, and an optical axis of the first light beam is slanted from the optical axis of the objective lens, the objective lens being designed to give priority to application of the first light beam to the recording medium,

wherein the first surface of the diffraction grating has having a first-order diffraction efficiency of almost zero for the first light beam forwarded from ~~[[said]]~~ the first light source and emits emitting the first-order diffraction light for the second light beam forwarded from ~~[[said]]~~ the second light source~~[[;]]~~, and the second surface of the diffraction grating ~~[[being]]~~ is designed to realize a differential push-pull method of sensing a tracking error sense signal~~[[;]]~~, and

wherein the first and second surfaces of the diffraction grating do not diffract returned light from ~~[[a]]~~ the recording medium.

7. (Previously Presented) The optical head device according to claim 6, wherein the depth h01 of the grating groove of said first surface of the diffraction grating is expressed by

$$h01 = m1 \cdot \lambda / (n1 - 1) \text{ and}$$

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the depth h_2 of the grating groove of said second surface of the diffraction grating is expressed by

$$h_2 = m_2 \cdot \lambda_2 / (n_2 - 1)$$

where n_1 is the refractive index of said first surface of the diffraction grating, n_2 is the refractive index of said second surface of the diffraction grating, λ_1 is the wavelength of said first light source, λ_2 is the wavelength of said second light source, and m_1 and m_2 are natural numbers.

8. (Original) The optical head device according to claim 7, wherein at least one of said m_1 and m_2 is 1.

9. (Currently Amended) The optical head device according to any one of claims 6, 7 and 8, wherein said ~~first diffraction grating~~ and ~~[[said]]~~ second surfaces of the diffraction grating are formed integrally on a substrate.

10. – 18. (Canceled)

19. (Currently Amended) The optical head device according to claim 6 ~~[[18]]~~, wherein said recording medium includes a first disk to be read from when said first light source is used and a second disk to be read from when said second light source is used and satisfies the following expressions;

$$t_1 (\text{DVD}) < t_2 (\text{CD})$$

where t_1 is the substrate thickness of the first disk and t_2 is the substrate thickness of the second disk.

20. – 26. (Canceled)

27. (Original) An optical head device comprising:
a first light source for emitting a light beam of a first wavelength;
a second light source which emits a light beam of a second wavelength differing from said first wavelength;
a single block wherein the first and second light sources are aligned thereon;

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an objective lens for causing the laser light from said first or second light source to converge on an optical disk; and

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element, wherein

said hologram has a first marker attached to the projected position in the direction of the optical axis of said second light source, the first marker serving as a mark in installing said hologram.

28. (Original) An optical head device comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the laser light from said first or second light source to converge on an optical disk; and

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element, wherein

said hologram has a first marker attached to the position of the midpoint between the projected position in the direction of the optical axis of said first light source and the projected position in the direction of the optical axis of said second light source, the first marker serving as a mark in installing said hologram.

29. (Previously Presented) The optical head device according to any one of claims 27 and 28, wherein, if the numerical aperture when the light beam from said first light source is used is NA1 and the numerical aperture when the light beam from said second light source is used is NA2, the expression $NA1 > NA2$ is satisfied.

30. (Original) The optical head device according to any one of claims 27 and 28, wherein said hologram has a second marker attached to the position corresponding to an optical axis extending to any point on said light-receiving element.

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31. (Original) The optical head device according to claim 30, wherein said any point is the center of said light-receiving element.

32. (Original) The optical head device according to claim 30, wherein said any point is the marker provided on said light-receiving element.

33. - 35. (Canceled)

36. (New) The optical head device according to claim 27, further comprising:
a diffraction grating having first and second surfaces provided between the hologram and the single block, wherein the first surface of the diffraction grating has a first-order diffraction efficiency of almost zero for the first light beam forward from the first light source and emits the first-order diffraction light for the second light beam forwarded from the second light source, and the second surface of the diffraction grating is designated to realize a differential push-pull method of sensing a tracking error sense signal, and wherein the first and second surfaces of the diffraction grating do not diffract retuned light from a recording medium.

37. (New) The optical head device according to claim 36, wherein the depth h_{01} of the grating groove of said first surface of the diffraction grating is expressed by

$$h_{01} = m_1 \cdot \lambda_1 / (n_1 - 1) \text{ and}$$

the depth h_{02} of the grating groove of said second surface of the diffraction grating is expressed by

$$h_{01} = m_1 \cdot \lambda_1 / (n_1 - 1)$$

where n_1 is the refractive index of said first surface of the diffraction grating, n_2 is the refractive index of said second surface of the diffraction grating, λ_1 is the wavelength of said first light source, λ_2 is the wavelength of said second light source, and m_1 and m_2 are natural numbers.

38. (New) The optical head device according to claim 28, further comprising;
a diffraction grating having first and second surfaces provided between the hologram and the single block, wherein the first surface of the diffraction grating has a first-order diffraction efficiency of almost zero for the first light beam forward from the first light source

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and emits the first-order diffraction light for the second light beam forwarded from the second light source, and the second surface of the diffraction grating is designated to realize a differential push-pull method of sensing a tracking error sense signal, and wherein the first and second surfaces of the diffraction grating do not diffract returned light from a recording medium.

39. (New) The optical device according to claim 6, further comprising the recording medium, wherein the recording medium has a plurality of tracks.